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Infantile Atrophy

I have selected this as the Subject of my thesis because of the great importance that attaches to it. Living as I do in a large working class neighbourhood, I have been impressed with the fact that a large number of children suffer from this affection and many die every year in our large towns.

Many of the lives might have been saved if proper means of prevention had been taken.

It is a striking fact that every year 140,000 children are born in this country,

to die before they reach the age of 12 months.

Not only is this the case but the vitality of those who survive is deteriorated by injudicious care & feeding. That this is so is proved by the fact that the standard of measurements for the British Army has been lately reduced to suit the defective physique of the recruits. The task which I have imposed upon myself in this paper is that of pointing out and suggesting methods whereby this great annual sacrifice of infant life may be prevented or lessened.

Infantile Atrophy is not a specific disease but rather

a condition of lowered vitality. It is a vice of nutrition and can, in most cases, be arrested at almost any period of its progress. It is almost ^{un}known in the well-to-do classes and is much rarer in the country than in towns. It is also very common in children's hospitals and foundling institutions. Holt has stated that in 44 hospitals for infants in New York with which he was connected it accounted for half the deaths.

The word comes from a privative, and τροφή nourishment and signifies not so much want of nourishment as the condition which results from defective

or improper feeding.
Other names given to the
condition are 'marasmus,'
'cachexia' and 'food atrophy'.
I do not propose to include
in this paper any references to
cases of atrophy which result
from inherited syphilis or tubercu-
lous disease nor those cases of gastro-
intestinal disorder not directly
connected with bad feeding.

Gastro-intestinal affections
figure frequently on death
certificates and they often
bring about a fatal termination
in cases where the child has
suffered from infantile atrophy
for some time. Both are likely
to arise from the same cause
viz - injudicious feeding and

Circumstances

circumstances in each case determine whether a child will perish from causes acting either on the mucous membrane of the Stomach - (gastric catarrh or gastritis) or those acting on that of the bowels - (enteritis or diarrhoea).

Etiology

The cause of this affection may be summed up in a few words. viz - defective assimilation of food.

There is not often a criminal deprivation of food but the giving of food which is unsuitable for the age of the child either in quantity or quality. I have compiled a record of 83 fatal cases occurring in
my

my practice here in Northampton,
a large industrial town with
a population of 89,863,
in the ~~13~~¹³ $\frac{1}{2}$ years between Oct.
1889 and April 1903.

The total number of deaths
of children of 1 yr. old and under
certified by me in that period
was 319.

This gives a proportion of 25.9%
of cases of Infantile Atrophy
in the total deaths.

Gastro-intestinal affections
were present in 51 cases, many
of them closely connected with
the condition.

These two together make 134
which is equal to 42% of the
total deaths under 1 year old
Age

The

The condition is most met with during the first few months of infantile existence, the suckling period when the digestive powers are feeble. In my 83 cases 69 or 83% were of age or over.

Sex.

The opinion that boys die more readily than girls is well borne out by statistics. Thus in Dr Ogley's English life table noted by R. Barker in the 10 years 1871-80 out of a million births there died before the age of 1 yr.

Males 158,583

Females 128,734.

To represent this in another way, Average number of deaths per 1000 births in England & Wales. 1871-80

Males 163

females 134.

In

In my own cases out of 319
deaths from all causes under a year
there were

Males 176 or 55%

females 143

from Infantile Atrophy

Males 44 or 58%

females 39

This is greater than the preponderance of male over female
births as shown in the last
table for 1902 (Registrar
General's Abstract)

For the whole of Northamptonshire

51.7% male

48.3% female

It is well known to shepherds
that young male lambs die
more readily than female.
I have not heard of any
Satisfactory

satisfactory theory which accounts for the greater vitality of the female.

The same relative proportions are maintained throughout life up to the age of 75 years as may be seen from the table quoted by Parkes.

Environment

444 or 53% of my cases were living in crowded courts with no through-passage of air or in crowded streets.

The absence of fresh pure air is a notable etiological factor in Northampton during the last few years many of these closed-in courts have been condemned and abolished by the Sanitary Authority

and

and in that period the death rate in infants under 1yr old has considerably fallen. For example

in 1897 it was 184.3 per 1000

in 1902 " " 145 " "

There is still room for improvement in this direction as the infant mortality is still higher than that of the 76 largest towns. (the latter being 135 per 1000).

During the period above mentioned the proportion of married women who work in factories during the day and leave their children to the care of others has considerably diminished.

But the birth rate of Northampton is lower than the average and it may be objected that this accounts

accounts for the high death rate
as Dr. Farr pointed out.

To shew that this is not so I
have compared the infantile
death rate of other large towns
which have a birth rate similar to
~~that~~ that of Northampton

Vital Statistics for 1st Quarter of 1903

Towns	annual birth rate per 1000 living	Deaths of children under 1 yr to 1000 births
Northampton	23.2	145
Brighton	24.7	99
Bury	22.2	133
Huddersfield	22.6	132
Halifax	22.4	114
Bradford	23.7	136
Blackburn	24.2	181
70 largest towns	30.1	135

The only town that surpasses
Northampton in the table is
Blackburn

we

We may presume that there the conditions unfavourable to infant life such as density of population, unhealthy atmosphere, employment of married women in the cotton mills, etc. exist to a greater degree than in Northampton.

All the other towns are of comparatively recent origin, whereas Northampton has been a considerable town since 1068 and still contains a large proportion of old houses with low ceilings and small cubic capacity. These latter are, of course, let to the very poor at small rents. Improved sanitary conditions all over the country will partly account for the
decided

decided reduction in the death rate amongst infants as for ex.

England & Wales	Children 1 yr & under
1897	156 per 1000
1902	135 " "

(see latest report of the Registrar General).

Illegitimacy

This accounts indirectly for a considerable proportion of deaths every year.

Without taking into account criminal baby-farming cases which are dealt with by the strong arm of the law it may be mentioned that the mothers in such cases have less desire that their unwelcome offspring should live to perpetuate their shame. They are generally obliged

obliged to earn their living in some way and leave their children to be cared for by strangers who are often ignorant & incompetent to a degree and are very poorly paid for doing so.

Some of these infants have been born prematurely or with a vigour much less than the average.

11 of my cases (equal to 13.2%) were illegitimate.

Feeding.

Of all causes this is the most potent. Great ignorance still unhappily prevails regarding the proper feeding of infants artificially, despite the increased facilities for education generally.

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In those instances in which the mother has sufficient breast milk the infants do well enough as a rule.

Even then one has often to warn them about giving the breast too frequently and thus setting up Catarrh of the Stomach or bowels. If the child is fatful, the breast is used to keep it quiet and a fresh supply of milk is taken into the Stomach before the last meal has been digested. This causes pain & more fatfulness and more is given with the result that matters are aggravated. The child in this way suffers from gastric catarrh, colic, sleeplessness or even convulsions.

all

all of which might be prevented by a little regulation of the nursing.

In some cases the mother's milk does not agree, although given at proper intervals, from some deviation in its composition from the normal standard.

Dr. Cheadle examined the milk in one such case by the microscope and found it to contain large granular corpuscles. Gustaf Smith recommended in a case seen by him that the child should have barley water given to it before nursing with a perfectly satisfactory result.

Besides this, many young mothers cannot remain content to see their

their offspring thriving moderately.
The constant complaint heard
by the medical attendant is
that 'the breast did not seem
to satisfy it'.

They want to see the child
look like a prize-fed animal
and accordingly begin to give
oatmeal, arrowroot, corn flour,
fingers of bread dipped in sugar
or biscuits before the child can
digest these.

This causes the stomach to
become irritable & sickness
or diarrhea a result.

In 13 of my cases or 15.6 %
it was noted that starchy
food had been given or pure
milk at too early an age.

In most cases of Infantile
Atrophy

Atrophy, the child has been
bottle-fed. At any time
the artificial feeding of infants
is a difficult matter - There are
so many pitfalls to be avoided
that only those who are carefully
instructed can avoid them.
Cow's milk is used in the
vast majority of cases.

As its Casein is much denser
than that of human milk
it requires to be modified
and rendered soft & flocculent.
This is often done by barley water
or lime water in proper proportions
being added or simply by
raising it to the boiling point.
The milk of the goat is very
similar to that of the cow but
the casein of asses & mares'
milk

milk is soft & flaky like that of human milk.

There are other differences between cows milk & human which are represented by the following table taken from Eustance Smith's work

	woman	cow
Casein & extractives	3.9%	5.5%
Butter	2.6 ..	3.6
Sugar	4.3	3.8
Salts	0.13	0.6
Water	88.9	86.4

Analysis by MM. Vernois and Bequerel.

This may be compared with Gouff. Beranez quoted by Cheadle.

	woman	cow
Nitrogenous or protein elements	3.924	5.404
Hydrocarbon or fats	2.666	4.305
Carbohydrates	4.364	4.037
Salts	0.138	0.548
Water	88.908	85.706

Even when cow's milk is diluted with an equal quantity of water the proper proportion of fats and carbohydrates is not present and these require to be added.

Another cause of Infantile Atrophy is feeding on condensed milk. This often agrees well at first but if persevered with beyond about 6 weeks soon fails to nourish properly.

When diluted with 7 parts of water it is still too weak in both fat & proteins thus —

	human	condensed milk with 7 parts of water
Proteid elements	3.924	3.26
Fats	2.666	1.6
Carbohydrates	4.364	5.37
Salts	0.138	0.5
Water	88.908	89.27

There are few children who can do with condensed milk stronger than 1 in 24 parts at first so that, unless cream & meat juice are added, the amount of nutriment contained is still much below the standard.

It has also been shown by Cheadle that it lacks the anti-scorbutic element contained in fresh milk and tends to produce scurvy.

The large percentage of cane sugar it contains undergoes lactic acid fermentation and sets up considerable irritation.

The more milk is altered from the natural state the more likely is it to produce scurvy.

Other causes may be mentioned
such as

such as cleft palate which prevents the child sucking properly - sewage contaminated, too humid or too changeable atmosphere ~~and~~ the use of flannelette instead of wool or imperfect clothing.

Morbid Anatomy.

In cases where the body has been examined there is found Thrush on the mouth. bedsores or erythema of the buttocks. There is an entire absence of fat in the body.

According to Purror there is fatty degeneration of the kidneys, lungs & brain and sometimes ulceration of the Stomach; rarely haemorrhage into the cranial cavities.

Diagnosis

There is not usually much difficulty. The child is seen to fail in health & lose weight or make no progress.

Our chief care should be to exclude organic disease, syphilis or tuberculosis.

The diagnosis is confirmed when the child begins to thrive after proper measures are adopted.

Symptoms

These only require a passing mention.

Wasting. This is the most important and is the one that generally first leads the mother to seek advice. A healthy child should gain at the rate

of 2 to 4 oz per week and should double its weight in the first six months. Medical practitioners might carry with them a pocket salters' spring such as is used by the officers of the Society for Prevention of Cruelty to Children. By means of a towel the child could be weighed at regular intervals. Say - a week - In a case depicted in Holt's work the weight of the infant at 10 months was 6 lbs. It had weighed at birth as much as 10 lbs.

Wrinkled dry & yellow skin which gives a characteristic "old man" look to the face

Drowsiness - in sucklings
 it is noticed that they often
 fall asleep while taking the
 breast, a sure sign, according
 to Estelle Smith, that the
 milk is watery in quality.
 Thirst - constant screaming
 or whimpering with a feeble cry.
 Rash may appear; lichen
 scrophulous, urticaria or
 erythema - This latter is
 most characteristic and is
 due to the acid character
 of the motions. It is always
 associated with 'white mouth'
 in the lay mind and mothers
 will often tell you that the
 latter has "gone through"
 the child. Purgatives are
 sometimes given to accomplish

this end with anything but
beneficial results to the
child

I have also on several occasions
seen purpura present on
the body.

Bowels irritable, often distended
with gas. There are intercurrent
attacks of vomiting & diarrhoea
with clay coloured stools of a
fœtid character, mixed with
green mucus.

Aphthae, stomatitis or Thrush
Anaemia: oedema of the
feet which are also cold.

The temperature is subnormal;
often only 94° F. in the rectum
Twitchings & startings.

Convulsions are said by Sutherland
Smith to be rare from this

Cause

Cause alone.

In rare instances Opisthotonus has been noticed from reflex spasm of the muscles of the neck.

Prognosis

If the child has reached the age of 8 months it is good because the salivary & pancreatic secretions become active about that period.

It is grave when the temperature is subnormal or according to Angel money when thrush is present. Many women in this neighborhood have the notion that it is a certain sign of approaching death but I have distinct recollections of cases which have

recovered

recovered in which this was present to a extreme degree. Serious nervous disturbances such as convulsions, opisthotonus, "spurious hydrocephalus" or coma are of grave import. The same may be said of purpura.

If the child's surroundings and feeding can be modified in the manner suggested below we may generally expect recovery -

Treatment

A wet nurse who is healthy and whose milk corresponds to the age of the child is a great boon in such cases but this is practically out of the question

as the vast majority of the
cases occur among the ^{the}
poor

The same remark applies to
asses or mare's milk.

In London the former can
be obtained but at a high
price which is prohibitive.

If possible the mother should
suckle her infant for at least
a month. After that age it
may be put on a mixture
of boiled cow's milk, boiled
water and freshly prepared barley
water at a temperature of
95° F. These three are to
be mixed in equal parts at
first, the proportion of cow's
milk being gradually increased
Young infants bear any
sudden

sudden change in the food
very badly.

The above preparation should
be given from a boat shaped
or oval feeding bottle without
a tube which ~~are~~ ^{can be} supplied
by Maw & Son or Allen and
Hambury. The latter make
is the best as both ends are
covered with rubber which
can be taken off and the
whole of the interior can be
thoroughly cleaned.

I recommend two bottles, ~~one~~
to be allowed to soak in a
solution of soda or borax
when not in use.

Milk can be sterilised by
being raised to the boiling
point which is about

24 degrees above that of water
viz 233° F.

Aymard's steriliser is very
convenient. The milk
should be so treated as soon
as it arrives at the house.

Barley water can be prepared
by the method recommended
by Angel Mery as follows:-
Two teaspoonfuls of Scotch or
pearl barley are put into a
bint of cold water. This
is put on the fire and boiled
down to $\frac{2}{3}$ rds of its bulk
and afterwards strained
through muslin.

If diarrhoea be a prominent
symptom lime water may
be added in the proportions
of 1 in 12 parts.

L.H.

If cows milk disagrees
or if it cannot readily be
procured of good quality,
condensed milk may be
tried for a time.

The Anglo-Swiss brand appears
to me to be the best in the
market - a teaspoonful &
half a bottle of water.

It requires the addition of
cream as already hinted.
This can be got from the
"Ideal" brand made by the
same firm. It contains
about 30% of cream and
I have seen babies thrive
well on it.

In severe cases milk in
any form must be abandoned
for a time and nothing

but

but barley water and meat
juice given - Sometimes this
requires to be given in teaspoon-
-ful doses every $\frac{1}{2}$ hour or so.
Meat juice is prepared as
follows. -

Free from fat and gristle $\frac{1}{4}$ lb
of fresh raw meat, chop fine
& put into a cup or basin with
just as much cold water
as will cover it. Leave for
half an hour, occasionally
stirring it & squeezing the
meat with the back of a spoon.
Strain through muslin and
sweeten slightly.

It has been my experience
that this process takes too
much time & trouble for most
mothers of the poorer class

and

Therefore I recommend a proprietary preparation of meat juice known as "Bovinine".

It is nearly tasteless and is preserved with whiskey. It can be given in doses of 5 to 10 drops in each bottle or even more than that according to circumstances. A two ounce bottle can be procured for 1/- and will keep well for a considerable time. There is another preparation which I have recommended extensively during the last 18 years known as "white wine whey". It is prepared as follows. Put a breakfast cupful of new milk on the fire, as soon as it boils add a glass of food tinned sherry, allow to boil for 1 minute
Take

take off the fire and strain through muslin. Sweeten. The resultant yellowish serum can be given either pure or diluted with barley water.

I am satisfied that this preparation has saved life in not a few instances.

If food sherry is not used the coagulation does not take place satisfactorily and ~~too~~ much milk passes through the muslin. It should always be examined by the medical attendant to see that it is of the proper quality.

If there is a subnormal temperature, cold & livid extremities and a depressed fontanelle recourse must be had to

Brandy

Brandy. A good rule for its administration is to give 10 drops for every month of the child's age up to 3 months.

In certain cases the milk requires to be peptonised.

This can be done by using the "Zymine" powders of Burroughs Wellcome & Co. One of these is put into a pint of milk which is kept at blood heat for 10 minutes after which it is raised to the boil to stop further action of the ferment.

The "Peptogenic milk powder" of Fritchard is also serviceable. My experience of "Panopeptone" prepared by the same firm is limited but it appeared to act as an excellent restorative

Mention also may be made
of Savory & Moore's peptonised
condensed milk.

As the child recovers strength
& vigour of digestion, milk &
starchy foods, fine oatmeal
or Savory & Moore's Food may
be given. Amongst the ^{number} ^{have}
of Infants Foods I kept to
this one and find it suitable
in almost every case, if made
dilute at first.

Allen & Hanbury's Food Nos 1,
2 and 3 are also excellent foods.
For medicine a purgative
is often advisable at the
onset, either castor oil
or fluid magnesia.

The most frequent prescription
I have used contains 3 to 5
grains

grains of Bicarbonate of Soda
1/2 a minim of T. Unc. Vom. in
Ag Cassiaumoni or ag iucosofoni
Liquor Arsenicalis is a valuable
fastic sedative in drop doses
or even half a drop. It is most
useful in cases where there is
lenteric diarrhoea in which
the food passes through the
Alimentary canal very soon
after being swallowed.
It may be given before food.
Each symptom must be
treated as it arises, for example
Convulsions or worms.
The blander preparations of
Iron and Cod Liver oil are
usually administered to
"round off" the treatment
Every day whatever the weather
be

be almost the child should be taken out into the open air for about an hour and should wear a flannel binder to guard against chills.

Prophylaxis

This is of great moment in view of the national importance of the subject already adverted to. Instruction on the care and feeding of babies ought to be given to the older girls in public schools as a branch of domestic economy or evening classes like our present Ambulance classes held for the purpose in the evening so that young women at work might attend.

In France there have been established

established lately institutions
for systematic instruction
in these matters.

The girls are taught practically
a great many matters useful to
them in the household. A baby
is washed, dressed & fed before
their eyes to impress the lessons
on their memories.

I am tempted in this
connection to quote Horace—
"Siquis irritant animos demissa
per aures

Quam qual sunt oculis subjecta
fidelibus et qual
Ipse sibi tradit spectator."

In my opinion such measures
would do much to remove the
present gross ignorance which
prevails and would save
many

many young lives.

In cases where the parents are too poor to buy milk it should be the duty of the State to provide, free of charge, at convenient centres, pure milk sterilized which should be sent out in proper bottles with printed instructions as to its use.

This work might very well be undertaken by Boards of Guardians and a recommendation from the medical attendant insisted upon in each case.

It would also be possible to establish laboratories in connection with these where milk prescriptions of any strength of protein or fat

cont'd

could be made up.

Such laboratories exist in Boston, New York and other American cities. They were established by Rotch (see Archives of Pediatrics) in 1893.

The following solutions are used in them. —

1. Cream containing 16% offat
2. Separated milk from which the fat has been removed by the Centrifugal machine
3. A 20% standard solution of milk sugar.

The number of feedings in the 24 hours and the amount at each feeding are given out with the supply.

Milk prescriptions are now prepared by the Walker Sordano.

79 Duke St. London. W.

The Aylesbury Company
also sends out what is
described as humanized milk
in glass bottles, properly
sterilized.

I would also give prominence
to the example that has
been set to medical Officers
of health by one in a district
of London who sent out
pamphlets broadcast
among the people with
short & clear instructions
as to the care & feeding of
infants.

District nurses who exist
in almost every town of
moderate size might undertake
this in the course of their
daily

daily visits

Laws ought to be passed making it punishable for mothers to go out to work and leave their children in the care of older children or incompetent persons.

Public crèches such as exist in Paris might be established where babies could be properly cared for at a nominal charge till the return of the mothers from work in the evening.

Whilst I do not disparage the excellent work done by the officers of the Society for the Prevention of Cruelty to Children I cannot but express my belief that they

each

could be made still more useful if their attention was more frequently directed to the young babies which are often made to suffer from the ignorance of their parents.

In cases of wilful neglect I have ~~often~~ witnessed a good effect produced in the neighbourhood by a conviction and there are those for whom this deterrent is necessary.

In conclusion, these latter measures, although not such as medical men could carry out themselves, are of such a far-reaching and beneficent nature that, in the carrying
of them

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of them out the powers
that be, would secure
the hearty and loyal
coöperation of the whole
medical profession.

David Starr
M.D., C.M.

over
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